Effect of Sonar Beamwidth and Slopping Sea Bed on the Accuracy of Bathymetric Survey

Amos Ugwuoti, Lecturer 1, OLiver Ojinnaka, Professor and Angela Etuonevbe, Ph.D Student (Nigeria)

Key words: Hydrography; Standards; Sonar Beam width, Slopping sea bed

SUMMARY

Sound energy emitted from an echo sounder transducer face spreads as it travels through the water column and this spreading, affects the manner in which the returning signal describes the sea floor. These effects include the introduction of horizontal displacement when the seafloor is sloping, the smoothing of the shape of large features and the obscuring of features whose wavelengths are less than twice the ensonified area. Great efforts are being made by sonar engineers to produce transducer that control this spreading and allow the focusing of the sound energy. In an attempt to check this and many other sources of errors inherent in bathymetric surveys, the International Hydrographic Organization (IHO) has divided areas of survey into different orders and also specified their accuracy requirements. An investigation was carried out to determine the extent of the uncertainties caused by the spreading of the emitted sound energy from the sonar systems, and the sloppy nature of the sea beds upon which the acoustic energy is incident, using the accuracy specifications of the IHO. This research work was able to determine (from various computational approaches), the uncertainties in bathymetric surveys due to sonar beam widths and sloping sea beds. The result shows that the maximum beam widths of transducers that should be employed in bathymetric surveys within the international Hydrographic organization's special order, and order 1a and 1b criteria should not be more than 6 degrees and 12 degrees respectively.